



**LOW NOISE FULL INTEGRATED MULTILAYER[[S]] MAGNETIC FOR POWER
CONVERTERS**

Related Applications

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This is a continuation of United States Patent application serial number 08/351,943, filed
5 on December 8, 1994, and entitled "Low Noise Full Integrated Multilayer Magnetic for Power
converters[[.]]," incorporated herein by reference.

Field of the Invention

This invention relates to DC-to-DC converters, DC-to-AC, AC-to-AC and AC-to-DC
converters. The major characteristics of this power conversion technique is are that all the
10 magnetic elements are implemented on the same multilayer[[s]] structure, ~~and the power transfer~~
is made highly efficient and ~~by minimizing the common mode noise~~ is minimized.

Background of the Invention

There is a continuing industry demand for increasing power density, which means more
power transferred in a given volume. A method for increasing the power transfer through the
15 converter is to increase the switching frequency in order to minimize the size of ~~magnetic~~
magnetics and the capacitors. Using prior art topologies such as forward or flyback, which
employ "hard" switching techniques, makes high frequency operation less efficient. The
switching losses associated with switch elements, which turn on when there is a voltage across
them, are proportional with the switching frequency. An increase in switching frequency leads
20 to an increase in switching losses and an increase in level of electromagnetic interference (EMI).

In order to overcome limitations in switching speeds, the prior art has devised a new
family of resonant and quasi-resonant converters. In the case of quasi-resonant converters, the
prior art technique consists of shaping the current or voltage to become half-sinusoidal and to
perform the switching when the current or voltage reaches zero. The reactive elements, which
25 contribute to shaping the current or voltage, are part of the basic circuit and are considered
undesirable in classic topologies. An example of one such circuit can be found in Vinciarelli,